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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,686	12/17/2003	Xinwu Chen	02964.002543	4140

5514 7590 09/18/2007  
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NEW YORK, NY 10112

EXAMINER
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NEWMAN, MICHAEL A

ART UNIT	PAPER NUMBER
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2624

MAIL DATE	DELIVERY MODE
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09/18/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/736,686

Applicant(s)

CHEN ET AL.

Examiner

Michael A. Newman

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4, 5, 8, 10, 11 and 19 is/are pending in the application.
- 4a) Of the above claim(s) 3, 4, 6, 7, 9, 12-18 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1, 2, 4, 5, 8, 10, 11 and 19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendment to the specification and claims received on August 9<sup>th</sup>, 2007 has been entered.
2. In view of the amendment received on August 9<sup>th</sup> 2007, the cancellation of claims 3, 4, 6, 7, 9, 12-18 and 20 is acknowledged.
3. In view of the cancellation of claims 4, 6, 7, 9, 18 and 20 and the amendment of claims 5 and 8, the objection to claims 4-9, 18 and 20 is withdrawn.
4. In view of the cancellation of claim 20 and the amendment of claim 19, the rejections of claims 19 and 20 under 35 U.S.C. 101 is withdrawn.
5. In view of the amendment to the specification, the objection to the disclosure due to minor informalities is withdrawn.

### ***Response to Arguments***

6. Applicant's arguments filed on August 9<sup>th</sup> 2007 have been fully considered but they are not persuasive.
  - a. On page 11 of the remarks, in regards to the rejection under 35 U.S.C. 103 of the independent claim 1, applicant correctly notes that the primary reference, Suzuki (U.S. Patent No. 5,859,921), does not disclose or suggest using a ratio of dark areas in a neighborhood region of a candidate eye area to judge whether it is a real eye area. This was noted in the first office action, necessitating the introduction of the secondary teaching from Ando (U.S. Patent

No. 5,008,946). Applicant further submits that the cited portions of Ando relate to setting a threshold value used for the detection of pupils and do not describe the detection of pupils or a portion of an eye. However, although Ando is ultimately setting a threshold as way of calibrating the eye detection system, the methodology involves recursively testing the effectiveness of each threshold adjustment by detecting black edges of eyebrows, pupils, etc (**Ando Col. 18 lines 5 – 9**) using the claimed method. Since Suzuki already taught the general steps of eye detection, Ando was introduced to teach specifically the eye-detection method involving the ratio of black pixels to total pixels as cited in the first office action. In other words, simply because Ando uses the results of its eye-detection method for other purposes does not disqualify it as an eye-detection method usable as a simpler substitute to Suzuki's eye evaluation function, EFV. Based on this reasonable interpretation of the prior art, the examiner respectfully insists that Suzuki in view of Ando teach all the limitations of the independent claim 1 as set forth in the standing 103 rejection.

b. On page 12 of the remarks, in regards to the rejection under 35 U.S.C. 103 of the independent claim 1, applicant contends that Suzuki discloses a technique to extract an eye area when a driver wears glasses. Applicant further submits that the technique Ando presents, however, might not easily extract an eye area even if a driver wears glasses. As such, applicant suggests that it would not have been obvious for one skilled in the art to substitute the method of eye area detection in Suzuki with that of Ando. Respectfully, Suzuki teaches an

eye detection system which is not only limited to the observation of individuals wearing glasses, but also those with eyes and eyebrows. Ando teaches a simpler eye-detection technique. Clearly, one of ordinary skill in the art would be motivated to use a simplified eye-detection technique in an eye-detection system to reduce processing load and time, although perhaps reducing its applicability.

***Claim Rejections - 35 USC § 103***

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1, 2, 5, 8, 10, 11, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki (U.S. Patent No. 5,859,921) in view of Ando (U.S. Patent No. 5,008,946). Hereinafter referred to as Suzuki and Ando respectively.

a. Regarding claims 1, 10 and 19, Suzuki teaches a human eye detection method and apparatus comprising: an input unit that inputs an image (**Suzuki Fig. 1 – element 1 and Fig. 2 – step 1**); and a processor (**Suzuki Fig. 1 element b**) that (i) analyzes the image to obtain a candidate eye area (**Suzuki Fig. 1 – elements 4 and 5**); (ii) determines a neighborhood region in the image of the candidate eye area, the neighborhood region being a region encompassing the candidate eye area (**Suzuki Fig. 1 elements 5 and 6 – See Col. 20 lines 60 – 62**); Suzuki goes on to teach an eye area function (EFV) to validate the candidate eye regions (**Suzuki Col. 21 lines 26 – 34**), if the candidate eye area is determined as a real eye area it remains in the list; else,

the candidate eye area is determined as a false eye area and deleted from the list (**Suzuki Fig. 9 – Steps S626, S621 S623 and S618**) [Note that Fig. 9 teaches the eye-evaluation step; furthermore, by setting the appropriate flag for each eye region, they are effectively removed from or affirmed to the candidate list]. However, **Suzuki fails to teach** an eye-evaluation process which (iii) calculates the neighborhood region's size  $S$ , (iv) detects dark areas in the neighborhood region and determines the total count  $N$  of dark areas in the neighborhood region, (v) and compares the ratio  $N/S$  to a predetermined first threshold, wherein if the ration  $N/S$  is smaller than the first threshold, the candidate eye area is judged to be a real eye area, else the candidate eye area is judged to be a false eye area. **Pertaining to the same field of endeavor, Ando teaches** a pupil detection system in which the validity of a detected pupil is determined for the purposes of setting a variable threshold. Ando teaches (iii) obtaining the total number ' $S$ ' of pixels contained in a region ' $S_d$ ' (which contains the eye area) (**Ando Col. 18 – lines 34 – 35**), (iv) obtaining the number of black pixels ' $S_b$ ' in the region ' $S_d$ ', (**Ando Col. 18 – lines 31 – 32**), (v) comparing the ratio  $S_b/S$  to thresholds (**Ando Col. 18 - line 38**) and if the ratio does not lie within a range, deeming the area unsatisfactory [i.e. not correctly detected as an eye region] and requiring a correction to the threshold value. **Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Suzuki by substituting the eye evaluation function, EFV, generating step as taught by Suzuki with the valid eye**

region detection method as taught by Ando in order to greatly simplify the eye-region verification process by eliminating the need to evaluate the complexity and maximum of the histogram (Suzuki Fig. 9 – steps S607 and S608 respectively) as well as finding the product of two auxiliary functions EFV1 and EFV2 (Suzuki Fig. 9 – step 609) and replacing it with a simple pixel-counting/image-area sizing scheme.

- Regarding claim 19, Suzuki is silent as to whether the implementation of the aforementioned steps is as program code or discrete logic elements; however, Ando teaches the implementation of the eye detection method using a microprocessor with corresponding ROM and RAM (Ando Fig. 1 elements 8,9 and 10) [See also Col. 7 lines 27 – 30]. Such microprocessors clearly rely on coded instructions to perform the desired operations. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to realize the steps taught by Suzuki and Ando by way of processor-executable program code in order to reduce cost and speed development by eliminating multiple discrete components as well as exploiting the flexibility of a programmable device.

b. Regarding claim 2, Suzuki in view of Ando teach all the limitations of the independent claim 1 as set forth in the 103 rejection of claim 1 above. **Suzuki also teaches** determining candidate face areas on the basis of said judged candidate eye area obtained from said step f (Suzuki Col. 7 lines 33 – 40).

c. Regarding claims 5 and 11, Suzuki in view of Ando teach all the limitations of the independent claims 1 and 10 and dependent claim 2 respectively as set forth in the 103 rejection of claims 1, 2 and 10 above. **Suzuki also teaches** correctly obtaining characteristic features of a face image by converting it into a binary image (**Suzuki Col. 3 lines 25 – 28**). In the pupil detection method taught by Ando used to modify Suzuki, **Ando also teaches** that the region surrounding the eye, 'S<sub>d</sub>' is also binarized using a threshold value so as to easily separate regions whose grey levels change rapidly (i.e. potential eyes) from the background within the region (**Ando Col. 4 lines 33 – 42**). **Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to binarize both the entire image and the candidate eye regions by thresholding their grey scale values in order to easily differentiate dark regions (potential eye regions) from background regions while avoiding the need for additional/redundant processing steps for each.**

d. Regarding claim 8, Suzuki in view of Ando teach all the limitations of the independent claim 1 and the dependent claim 2 as set forth in the 103 rejection of claims 1 and 2 above. In the pupil-detection method used to modify Suzuki, **Ando also teaches** as part of the method, a threshold or comparison value, K, calculating step prior to the ratio comparison (**Ando Col. 20 lines 59 – 63**). **Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a variable threshold or**



**comparison value calculation so as to optimize the pupil detection criteria  
based on individual input image.**

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Newman whose telephone number is (571) 270-3016. The examiner can normally be reached on Mon - Thurs from 9:30am to 6:30pm (EST).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir A. Ahmed can be reached on (571)272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

M.A.N.



SAMIR AHMED  
PRIMARY EXAMINER